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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,999	02/06/2002	Bernard Aspar	034299-382	3061
7590	11/02/2004		EXAMINER	
Robert E. Krebs Thelen Reid & Priest LLP PO Box 640640 San Jose, CA 95164-0640			RICHARDS, N DREW	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 11/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/071,999

Applicant(s)

ASPAR ET AL.

Examiner

N. Drew Richards

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 26 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 20-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 20-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
  - 2) ☒ Certified copies of the priority documents have been received in Application No. 09/413,483.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 20-24, 26, 30 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Vakhshoori et al. (U.S. Patent No. 5,328,854).

Vakhshoori et al. disclose a structure in figure 1 for vertical electrical conduction comprising:

a thin layer 19 integral with a support 12 of conductive or semi-conductive material (layer 12 is made of metal with is conductive), the thin layer 19 being a layer of conductive or semi-conductive material (layer 19 is semiconductive as disclosed on column 2 line 67 through column 3 line 12) made insulating by ion implantation (regions 22 are made insulating by ion implantation, column 3 lines 24-37 for example) except for at least one zone (shown as a central region in figure 1 with arrows pointing through it) that allows vertical electrical connection between the face of the thin layer opposite to the support and the face of the support opposite to the thin layer.

With regard to claim 21, the thin layer comprises a multitude of the zones distributed over the entire surface of the thin layer. The device is disclosed as an array and thus a multitude of the devices of figure 1 are disclosed.

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With regard to claim 22, the thin layer comprises one of said zones to constitute at least one conductive path or conductive track.

With regard to claim 23, the thin layer 19 is made integral with the support through an intermediate conductive interface (the interface between layers 12 and 14 is a conductive interface).

With regard to claim 24, the conductive interface comprises a metal layer 12.

With regard to claim 26, a deposition of conductive bonding materials is associated with the intermediate conductive interface. Metal layer 12 is deposited, it is conductive and bonds to layer 14, and is a portion of the conductive interface.

With regard to claim 30, the material of the thin layer is chosen from among SiC, GaAs and InP (column 3 lines 5-11).

With regard to claim 32, the thin layer 19 is made integral with the support through an intermediate conductive interface (the interface between layers 12 and 14 is a conductive interface).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 25, 28, 29 and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vakhshoori et al. (U.S. Patent No. 5,328,854) as applied to claims

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20-24, 26, 30 and 32 above, and further in view of Jayaraman (U.S. Patent No. 5,513,204).

With regard to claim 25, Vakhshoori et al. do not teach the metal layer being palladium.

With regard to claims 28 and 34, the thin layer of Vakhshoori et al. is not made integral with the support through the use of a brazing material.

With regard to claim 29, Vakhshoori et al. do not teach the brazing material being based on indium.

Jayaraman teaches a vertical cavity surface emitting laser (VCSEL) with a vertically integrated optical pump. The device of Jayaraman, as shown in figure 9 for example, includes a short wavelength VCSEL 43 bonded to the bottom of a long wavelength VCSEL 40. The short and long wavelength VCSEL's are bonded together through a metal layer 75.

Vakhshoori et al. and Jayaraman are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious one of ordinary skill in the art to bond a second VCSEL to the bottom of the device of Vakhshoori et al. The motivation is to allow the VCSEL of Vakhshoori et al. to be used as an optical pump to operate long wavelength VCSEL. Therefore, it would have been obvious to combine Vakhshoori et al. with Jayaraman. In combination the support would be the long wavelength VCSEL and the conductive interface would be metal layer 75 that bonds the two VCSEL's together.

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With regard to claim 25, the metal layer 75 of Jayaraman is palladium (column 6 lines 1-7).

With regard to claims 28 and 34, in combination the thin layer would be made integral with the support (optical pumping VCSEL) through the use of a brazing material 75 (taught as indium solder, which is a brazing material).

With regard to claim 29, the brazing material is based on indium (column 6 lines 1-7).

With regard to claim 35, the thin layer as taught by Vakhshoori et al. is chosen from among SiC, GaAs and InP (column 3 lines 5-11).

5. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vakhshoori et al. (U.S. Patent No. 5,328,854) as applied to claims 20-24, 26, 30 and 32 above, and further in view of Peters (U.S. Patent No. 5,812,571).

Vakhshoori et al. does not teach the conductive bonding materials being successive deposits of titanium, nickel, and gold.

Peters teach a VCSEL similar to that of Vakhshoori et al. with a p-type contact 52 of successive deposits of titanium, nickel and gold. Though the contact is shown in figure 3 as being on the top surface of the device, the contact is formed on the surface that does not emit light. In combining the contact of Peters into the VCSEL or Vakhshoori et al. the Ti/Ni/Au contact would be formed on the bottom of the device in place of layer 12 of Vakhshoori et al.

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Vakhshoori et al. and Peters are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious one of ordinary skill in the art to form the bottom contact 12 of Vakhshoori et al. using the Ti/Ni/Au materials of Peters. The motivation is that the Ti/Ni/Au contact has good adhesion to semiconductors, has good thermal and electrical conductivity, and is a good barrier to solder so that application of solder will not compromise the semiconductor. Therefore, it would have been obvious to combine Vakhshoori et al. with Peters to obtain the invention of claim 27.

6. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vakhshoori et al. (U.S. Patent No. 5,328,854) as applied to claims 20-24, 26, 30 and 32 above, and further in view of Chino et al. (U.S. Patent No. 5,796,714).

Vakhshoori et al. do not teach the support being made of silicon.

Chino et al. teach a VCSEL 14 that is bonded to a silicon support 11.

Vakhshoori et al. and Chino et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious one of ordinary skill in the art to form the VCSEL of Vakhshoori et al. on the silicon support of Chino et al. The motivation for forming the VCSEL on a silicon support is to allow integration of the VCSEL with easily formed and well known silicon circuitry. Therefore, it would have been obvious to combine Vakhshoori et al. with Chino et al. to obtain the invention of claim 27.

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7. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vakhshoori et al. (U.S. Patent No. 5,328,854) as applied to claims 20-24, 26, 30 and 32 above in view of Chino et al. (U.S. Patent No. 5,796,714), and further in view of Jayaraman (U.S. Patent No. 5,513,204).

Vakhshoori et al. with Chino et al. teach adhering the VCSEL to a silicon support (thin layer made integral with silicon support. However, Vakhshoori et al. with Chino et al. do not teach adhering the VCSEL to a silicon support (thin layer made integral with silicon support) through the use of a brazing material based on indium.

Jayaraman teach various methods of adhering a VCSEL to a support structure. For example, in figure 9 a short wavelength VCSEL 43 is adhered to a long wavelength VCSEL 40 through use of an indium based brazing material 75.

Vakhshoori et al. with Chino et al. and Jayaraman are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious one of ordinary skill in the art to use the indium based brazing material to adhere the VCSEL of Vakhshoori et al. to the silicon support of Chino et al. It would have been obvious to use an indium based brazing material as these materials are well known in the art for use in adhering devices and substrates to one another. Therefore, it would have been obvious to combine Vakhshoori et al. and Chino et al. with Jayaraman to obtain the invention of claim 36.



***Response to Arguments***

8. Applicant's arguments with respect to claims 20-36 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

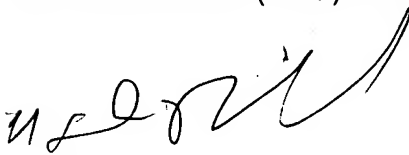
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Drew Richards whose telephone number is (571) 272-1736. The examiner can normally be reached on Monday-Friday 9:00-5:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
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